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Motorcycle braking:
UN Global Technical Regulation No. 3

Proposal for an amendment to UN Global Technical Regulation No. 3 (Motorcycle brake systems)

Submitted by the expert from Italy**

The text reproduced below was prepared by the expert from Italy proposing amendments to Global Technical Regulation (GTR) No. 3 It is a revised version of the proposal ECE/TRANS/WP.29/GRRF/2017/15 distributed at the eighty-fourth session of the Working Party on Brakes and Running Gear (GRRF) and informal document GRRF 86-10 distributed at the eighty-sixth session. The modifications to the text of UN GTR No. 3 are marked in bold for new characters or strikethrough for deleted characters.

* Formerly: **Working Party on Brakes and Running Gear (GRRF)**.

** In accordance with ECE/TRANS/274, para 52, with ECE/TRANS/WP.29/1139, para. 33 and with the programme of work of the Inland Transport Committee for 2014–2018 (ECE/TRANS/240, para. 105 and ECE/TRANS/2014/26, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

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I. Statement of technical rationale and justification

A. Introduction

1. One of the main purposes of UN Global Technical Regulation (GTR) No. 3 is to reduce the injuries and fatalities associated with motorcycle accidents by addressing the braking performance of motorcycles as a means of improving road safety.

2. UN GTR No. 3 provides clear and objective test procedures and requirements that can be easily followed and addresses the development of current Combined Braking Systems (CBS) and Anti-lock Braking System (ABS) technologies.

3. The objective of this proposal is to amend the current UN GTR No. 3 to technical progress addressing: electromagnetic immunity of ABS-systems, introducing ABS performance requirements for category[1] 3-5 vehicles (three-wheelers), ensuring uniform requirements for equipment such as Electronic Stop Signal (ESS) system and the means to disable the ABS, if equipped.

B. Justification of changes

4. The proposals aim to harmonise the UN GTR with the Supplement 3 to the 03 series of amendments to UN Regulation No. 78 as adopted at June 169th session of WP.29 and the 04 series of amendments as adopted during the 170th session of WP.29.

5. The development of draft language for updating the GTR involved consideration of the differences between the respective 1998 Agreement and 1958 Agreement. As the various amendments to UN Regulation No. 78 caused dis-harmonization with UN GTR No. 3, various proposals have been considered between the eighty-first and the eighty-seventh GRRF sessions to incorporate the harmonisation, collecting support and commitment of the Contracting Parties under the 1998 agreement. The main technical issues, including their justification for updating the global technical regulation are:

1. Electromagnetic immunity of ABS systems, paragraph 3.1.14.

6. With the increasing number and complexity of electronic braking devices, it is important to ensure that the braking performance is not affected electromagnetic perturbations by verifying the electromagnetic immunity. This UN GTR No. 3 amendment proposal is harmonised with UN Regulation No. 78, Supplement 3 to the 03 series (ECE/TRANS/WP.29/2016/56), amended by WP29-169-03. The specificities of self-certification have been considered, by providing for Contracting Parties to this UN GTR, to refer to national standards or to national regulations, in the case Electromagnetic Compatibility (EMC) Regulations if applicable in their national or regional situation.

2. Apply existing Anti-Lock Braking Systems (ABS) requirements to all vehicles of category 3, paragraph 4.9.1.

7. To apply the existing Anti-Lock Braking Systems (ABS) requirements to all vehicles of Category 3, based on ECE/TRANS/WP.29/GRRF/2015/42. If such vehicles were equipped with ABS, without the amendment, there would be no specific requirements

[1] As defined in the Special Resolution No. 1 concerning the common definitions of vehicle categories, masses and dimensions (S.R.1), document ECE/TRANS/WP.29/1045, Amend 1 and 2, Annex 2 - www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html

for the ABS braking performance in the GTR. This UN GTR No. 3 amendment proposal is harmonised and maintains technical compatibility with Regulation No. 78, Supplement 3 to the 03 series (ECE/TRANS/WP.29/2016/56, amended by WP29-169-03). The specificities of the 1998 Agreement have been taken into account as the scope extension of the ABS requirements is not extended to quadricycles (L_6 and L_7) vehicles[2] as due to the absence of definitions for this type of vehicles in Special Resolution adopted by the Executive Committee (AC.3) of the 1998 Agreement (S.R.1) relevant for the 1998 Agreement.

3. Emergency Stop Signal, paragraph 2.22. and 3.1.15. to 3.1.15.2.

8. The paragraphs 2.22. and 3.1.15. to 3.1.15.2. aim to introduce the installation of ESS on motorcycles. This proposed amendment involves only the condition of activating an ESS, not the lighting requirements. ESS is available on the market for motor vehicles. As motorcycles are used in the same traffic conditions, the option was considered to be beneficial also on motorcycles. The benefit of defining ESS provisions for vehicles of category 3 is to ensure similar behaviour as other road vehicles by harmonising the activation and deactivation criteria of ESS as applied to cars.

9. This UN GTR No. 3 amendment proposal is harmonised with UN Regulation No. 78, Supplement 3 to the 03 series (ECE/TRANS/WP.29/2016/56, amended by WP29-169-03. The associated amendment of Regulation No. 53 (lighting installation for L_3 vehicles) was adopted at 168th session of WP.29 (ECE/TRANS/WP.29/2016/22).

4. Means to disable the ABS function. paragraph 3.1.16.

10. This proposal is aimed at specifying the provisions for how to disable ABS and when this may be appropriate. Providing riders the ability to reduce or turn off ABS function completely on certain types of motorcycles is an important feature: there are riding conditions where locking the rear wheel is appropriate, such as deformable surfaces. Providing the rider a means to turn ABS off may limit the customers desire to tamper with the system and turn ABS off in a more permanent way, which could make ABS less available when needed.

11. The purpose of a two-step means of disabling ABS is intended to ensure disabling ABS is an intentional choice of the rider and providing reasonable provisions to ensure ABS is not inadvertently disabled. Conversely specifying a "simple" means of re-enabling ABS is intended to ensure the rider can at any time bring ABS back to full function. Re-enabling at ignition cycle is intended to prevent riders from inadvertently leaving ABS disabled when coming back to the bike.

12. With regards to the restriction to certain type of vehicles, the interpretation of 'off road' capability is to be determined by the manufacturer, based on product design and testing for expected customer usage building on consensus at the eighty-first session of GRRF, where delegates agreed '*to not unnecessarily restrict the kind of vehicle that could be equipped with the off switch function, by softening the wording of these provisions*'.

13. The new paragraph 3.1.16. clarifies the requirements of a means to disable the ABS function, if fitted, ("ABS Switch") for vehicles of Category 3. With this amendment, it is ensured that the implementation of an "ABS switch" is clear and uniform across different markets: *i.e.* if a vehicle is equipped with a function to disable the ABS, the ABS operation

[2] As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3.), document ECE/TRANS/WP.29/78/Rev.6, para. 2 - https://www.unece.org/fileadmin/DAM/trans/main/wp29/wp29resolutions/ECE-TRANS-WP.29-78r6e.pdf

status should be clear when starting, when in motion. In addition, disabling the ABS function should not be possible inadvertently.

14. The proposal is based on informal document GRRF-83-09 submitted by the representative of Italy and subsequent discussions in GRRF. The suggestions made by the representative of Canada (see GRRF-83-10) to include language about switching 'modes' to eliminate confusion with inconsistent use of terms 'deactivate' and 'disable' have been incorporated. It was advised to have the benefit of harmonized language similar to UN GTR No. 8, for ESC for vehicles of Category 1-1, 1-2 and 2. Situations described in the UN GTR No. 8, rationale (paragraph 83) for why different modes are needed did not seem applicable to motorcycle ABS. Simple ON/OFF functionality is considered sufficient. To address comments of inconsistencies of word use, the text was updated to refer simply to 'disable' or 'enable'.

15. As there are multiple indicators currently defined by International Standardization Organization (ISO), or other Standard Developing Organizations, they were also specified as acceptable in this proposal. This includes the use of text to label the indicator as allowed by the Federal Motor Vehicle Safety Standard (FMVSS) 122, consistent with the approach of UN GTR No. 8 and ISO 2575:2010. The ability to use the ABS malfunction indicator to also indicate disabled was retained in recognition of the limited space on a motorcycle as compared to a car and recognizing that tell-tale unequivocally indicates ABS is not available to the rider. It was considered necessary to keep the references to ISO 2575:2010 in line with the text in UN Regulation No. 78. The reference to ISO allows minor changes to the pictograms due to limitations in reproduction and display technologies and ensuring appearance and perceptibility of graphical symbols and information or to coordinate with the design of the equipment.

16. Following discussion at eighty-fourth session of GRRF, as suggested by Canada in GRRF-84-10, paragraph 5.1.15.3. in UN Regulation No. 78 that reads *'The method of determining deceleration is the responsibility of the manufacturer as long as the vehicle meets the technical requirements of this section. (ex. a prediction of deceleration from wheel rotation).'* was not taken across to the GTR as it was considered unnecessary in a self-certification system and keep the text certification neutral.

17. Sub-point (g) in this GTR amendment proposal, which makes it more explicit that manufacturers cannot provide additional means of disabling ABS, is included as a means of preventing defeat devices to be introduced. This supports the direction requested by the Contracting Parties at eighty-fourth session of GRRF who felt this prohibition needed to be explicit and allowed a provision that is acceptable in self-certifying markets.

18. The reactivation of the ABS under paragraph 3.1.16. (g), during standstill or while driving, will start the initiation of the ABS system start-up procedure which will lead without delay to the functional stage of the ABS complying with the system specification in paragraph 4.9. A time related delay cannot be specified due to technical issues regarding ABS system start-up procedure that include, but not limited to:

- When activating the system in a stationary condition, the system calibration/verification can only take place after motion of the wheel and can't determine how long the bike will be on before the rider chooses to start riding.
- The ABS system needs the opportunity to determine if vehicle maybe in a condition where it could be detrimental to the rider to activate ABS immediately. One example is a vehicle with a rear wheel locked and sliding sideways; activating the ABS and releasing the rear wheel lock could cause the bike to high side.
- Level of technology/equipment and features may require different amount of times to complete start-up procedure.

- The language should be such that the improvement of safety technologies is not limited by the regulation.

19. In paragraph 2.23. it is clarified that disabling of the ABS is allowed at one or more wheels to avoid different interpretations: e.g. turning ABS off on just the rear wheel(s), and leaving front ABS on is allowed, but would still be considered ABS off and need to adhere to paragraph 3.1.16.

C. Countries that have incorporated UN GTR No. 3 into their regulations

Canada

European Union

Japan

Republic of India

Republic of Korea

Russian Federation

United States of America

II. Proposed amendments

Insert a new paragraph 2.22. and 2.23., to read:

"2.22. "*Emergency braking signal*" means logic signal indicating emergency braking specified in paragraphs 3.1.15. to 3.1.15.2. of this Regulation.

"2.23. "*Disable the antilock brake system*" means to put the system into a state where one or more wheel(*s*) fitted with an antilock brake system no longer fulfils the technical requirements in paragraph 4.9. of this Regulation."

Insert a new paragraph 3.1.14., to read:

"3.1.14. The effectiveness of the braking systems, including the anti-lock system, shall not be adversely affected by magnetic or electrical fields. This shall be demonstrated by fulfilling the technical requirements in national standards or regulations, if applicable."

Insert new paragraphs 3.1.15. to 3.1.15.2., to read:

"3.1.15. If a vehicle is equipped with the means to indicate emergency braking, activation and de-activation of the emergency braking signal shall only be generated by the application of any service braking system when the conditions in paragraphs 3.1.15.1. through 3.1.15.2. are fulfilled:

3.1.15.1. The signal shall not be activated when the vehicle deceleration is below 6 m/s^2 but it may be generated at any deceleration at or above this value, the actual value being defined by the vehicle manufacturer.

The signal shall be de-activated at the latest when the deceleration has fallen below 2.5 m/s^2; or,

3.1.15.2. The signal may be activated at a speed above 50 km/h when the antilock system is fully cycling (as defined in paragraph 4.9.1.) and deceleration is at least 2.5 m/s^2. The signal shall be deactivated when the antilock system is no longer fully cycling".

Insert a new paragraph 3.1.16., to read:

"3.1.16. A means to deactivate the antilock brake system is only permitted for vehicles which are suitable for "off-road" driving.

If a means to disable the antilock brake system is provided it shall meet the following provisions:

(a) Disabling the antilock brake system function shall only be allowed when the vehicle is fitted with a ride mode selector that is in an "off-road" or "all-terrain" mode.

(b) Disabling the antilock brake system function shall only be allowed when the vehicle is stationary;

(c) Disabling the antilock brake system function shall be the result of a deliberate action by the rider according to one of the following methods:

(i) Simultaneous actuation of the antilock braking system disable-switch and a service brake system control (i.e. brake lever or pedal); or

(ii) The actuation of the antilock brake system disable-switch for a minimum of two seconds; or

(iii) The progression through at least two successive steps or levels of actuation of a control (e.g.., rotating knob, a touch panel or a menu option selector).

(d) The antilock brake system function shall be automatically enabled when exiting from the "off-road" or "all-terrain" ride mode, or after each start-up of the vehicle, except for restarts after unintentional stalling of the engine.

(e) When disabled, the antilock brake system function shall be indicated by the activation of a yellow or amber tell-tale according to one of the following methods until the ABS is fully functional or operating again:

(i) The following symbol as specified in B.18 in ISO 2575:2010:

Or

(ii) The following symbol as specified in B.05 of ISO 2575:2010:

With the word "OFF" as follows, according to Y.01 in ISO 2575:2010, whereby the relative position and size of the two symbols are defined by the vehicle manufacturer:

Or;

(iii) The text "ABS OFF", or "ABS not available", or,

(iv) The warning lamp referred to in paragraph 3.1.13., continuously activated (i.e. lit or flashing).

(v) Further to tell-tale(s) or symbol(s) specified in (i) to (iv), an additional or combined tell-tale may indicate for which wheel(s) the ABS is disabled.

(f) Enabling of a functional stage which complies with anti-lock brake system requirements in paragraph 4.9 shall be possible through the single actuation of a control (e.g. simple press of a button or switch) initiating ABS system start-up procedure.

(g) The manufacturer shall not make available to consumers hardware and/or software designed to allow a means of disabling ABS other than in compliance with the requirements set out in points (a) to (f).

This provision does not apply to what is required to service the ABS (e.g. electrical connectors)."

Paragraph 4.9.1., amend to read:

"4.9. ABS tests

4.9.1. General:

(a) The tests are only applicable to the ABS **if** fitted ~~on vehicle categories 3-1 and 3-3~~ ...

(b) The tests are to confirm the performance of brake systems equipped with ABS and their performance in the event of ABS electrical failure..."